IRM Installation and Configuration

Thu, Dec 30, 1993

Several steps must be taken to bring up a new local-station/IRM based upon the MVME-162 board. These are notes based upon experience in setting up node 561.

Be sure that the J20 jumpers are set to provide backup battery power for the on-board non-volatile memory. The two jumpers should be positioned away from the VMEbus P2 connector.

Make sure that a digital IndustryPack module is installed in slot B. If it is not, the system cannot run successfully.

Via the 162bug command **`pf 0`** and **`pf 1`**, select the baud rate for the 162 board console and host serial ports, respectively, to 19200, or whatever desired.

Via 162bug command **`cnfg;m`**, set the ethernet hardware address to be used. For example, enter 024000000561.

Via 162bug command **`env`**, change several parameters to match those used in another 162-based station. One key item is the Network Auto Boot Configuration Parameters Pointer, which should be set to `FFFC1000`.

Via 162bug command **`niot`**, set network parameters, such as

Node Control Memory Address	`001E0000`
Client IP Address	131.225.123.214
Server IP Address	131.225.123.215
Subnet IP Address Mask	255.255.0.0
Gateway IP Address	131.225.126.200
Boot File Name	`system`
Boot File Load Address	`120000`
Boot File Execution Address	`120000`

The 162bug command **`set`** `mmddyyhhmm` turns on the real time clock. This is needed for timing during the following TFTP transfer.

The 162bug command **`nbh`** downloads the system code. The TFTP protocol is used to transfer the system code known by the filename “system”.

Use the 162bug command **`bf`** `FFE00000:40000 0` in order to clear out all non-volatile memory on the CPU board. This will cause the system, upon initialization, to install a default table directory and initialize several

Use the 162bug command **go** 120000 to start the system code.

[At this point, the code runs for the first time. It aborts, because it cannot successfully return to 162bug following table directory initialization. Running the code a second time should succeed. The IPARP table will be initialized, as well as the TRING table, used by networking software. The low two bytes of the ethernet address should also appear at 405046 as the local station node#. The **niot** parameters are used to initialize the IPARP table at 40E010 with the station's IP address, subnet mask, gateway IP address, and MTU values. For example,

83E1 7BD6 FFFF 0000 IP addr 131.225.123.214, mask
83E1 7EC8 05DC 05DC gateway IP addr, MTU's]

Install the 09xx value, for example 09BF, as the UDP node# at 40507E. [The default value of 0964 will already be there, allowing immediate access by a node that can be configured to target the new IP address via node# 0964. This allows ordinary UDP-based Classic protocol to be used via ethernet to access the new node. The sender needs to have the appropriate IP address installed in the corresponding entry of the IP Address Table used by Acnet. But the receiver needs only know its own UDP node#.] Reset the system to let all this work.

Install the Acnet IP address table, which gives the IP addresses for the 09xx nodes. Copy from another station that has this table at 40FA00. (In a 133-based system, it is at 10FA00.) [The pointer to the 512-byte physical node address table used by Acnet should already be installed as address 40F800 at TRING+$78, or 405078.]

[A number of application program names should already be installed in the PAGEP table, as follows:

PAGEMDMP Memory Dump
PAGEPARM Parameter page
PAGEEDAD Edit Analog Descriptors
PAGEEDBD Edit Binary Descriptors
PAGELAPP Local appl params
PAGECRTI Remote page access
PAGEDNLD Download page
PAGEECHO Ping, Echo client
PAGENETF Network frames
PAGEMBLK pSOS-allocated memory blocks]

Copy any desired programs from another station, say 09BE, via the download page.

For operation away from Fermilab, also copy the HELPLOOP code from node 096F. This is a text "file" that is used to produce the prompting text for local application parameters accessed via page E.

[The data stream used for network diagnostics should already be installed at 401C00. Currently, this looks like:

```
8001 0010 0008 1000 Queue size is $1000.
0010 9000 0000 0000 Queue starts at 109000.
4E45 5446 5241 4D45 NETFRAME
```

Page F is used to display these diagnostics.]

[The default BADDR table should already be installed at 40A000. This provides some dummy non-volatile byte addresses in the 40FFxx area that can used for various system enable bits.]

[A minimum data access table should already be installed at 401000, such as:

```
7F00 0001 0000 0000 Repeat the following at 15 Hz
0000 0000 0000 0000

0405 0000 0040 A000 Update binary status data.
0000 0000 0000 0080 (BADDR at 40A000.)

1D00 0000 0000 0000 Run all enabled local appl's.
0000 0000 0000 0000]
```

Use 162bug command **env** to set network auto-boot parameters so the TFTP transfer can occur automatically at reset time, or perhaps only at power-on reset.

Load and enable local applications LOOPECHO, LOOPTFTP, LOOPAAUX. Use page E to do this, specifying the appropriate parameter values and labeling enable bits via page B.

LOOPECHO (supports UDP Echo testing)
Enable Bit# 00A9 UDP ECHO ENABLE

LOOPTFTP (TFTP server)
Enable Bit# 00B9 TFTP ENABLE

LOOPAAUX (needed at Fermilab only for Acnet)
Enable Bit# 00AE ACNAUX ENABLE
PNA node# 0921 (Gets PNA table from CNS33.)

162bug. Then enter the following command:

```
PFLASH 120000:20000 FF880000
```

To recover code later from Flash memory for execution, enter this command:

```
BM FF880000:10000 120000
```

To change the IP address configuration, several changes must be made. Note that if these changes are to be made from 162bug, all 004xxxxx addresses must be changed to FFExxxxx. This is because the non-volatile memory is mapped to the latter address upon reset to 162bug. When the system code initializes, this mapping is changed to 004xxxxx.

Change the IP address, subnet mask, gateway address via the **niot** command. Then change the corresponding parameters in memory at 0040E010.

Normally, we turn on the Network Boot option via the 162bug **env** command. When the system is powered up, it uses the TFTP protocol to copy the system code from the given Server IP Address. After the transfer is complete, it automatically begins execution of that code at 120000. To turn off this option, one must issue a Break when 162bug is starting up. Then one can use **env** to turn it off. For systems installed outside of Fermilab, booting can go faster if the Server is a local node, although TFTP can work successfully across the Internet. To perform the transfer manually, say, to get a copy of the latest system code, use the **nbh** command.

One can maintain a local copy of the system code on a workstation disk. Use the workstation's TFTP client command to do this (in binary mode) from a running IRM system. The system code will be copied onto a disk file. Then use the **niot** command to change the Boot File Name to access the workstation's disk.